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SUMMERSVILLE RESERVOIR, NICHOLAS COUNTY, WEST VIRGINIA

Pacific Northwest Environmental
Research Laboratory

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivded according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON
SUMMERSVILLE RESERVOIR
NICHOLAS COUNTY
WEST VIRGINIA
EPA REGION III

WORKING PAPER No. 469

WITH THE COOPERATION OF THE
WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES
AND THE
WEST VIRGINIA NATIONAL GUARD

JUNE, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the West Virginia Department of Natural Resources for professional involvement and to the West Virginia National Guard for conducting the tributary sampling phase of the Survey.

Ira S. Latimer, Jr., Director of the Department of Natural Resources; and John H. Hall, Chief of the Water Resources Division; and the Water Resources Division staff provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

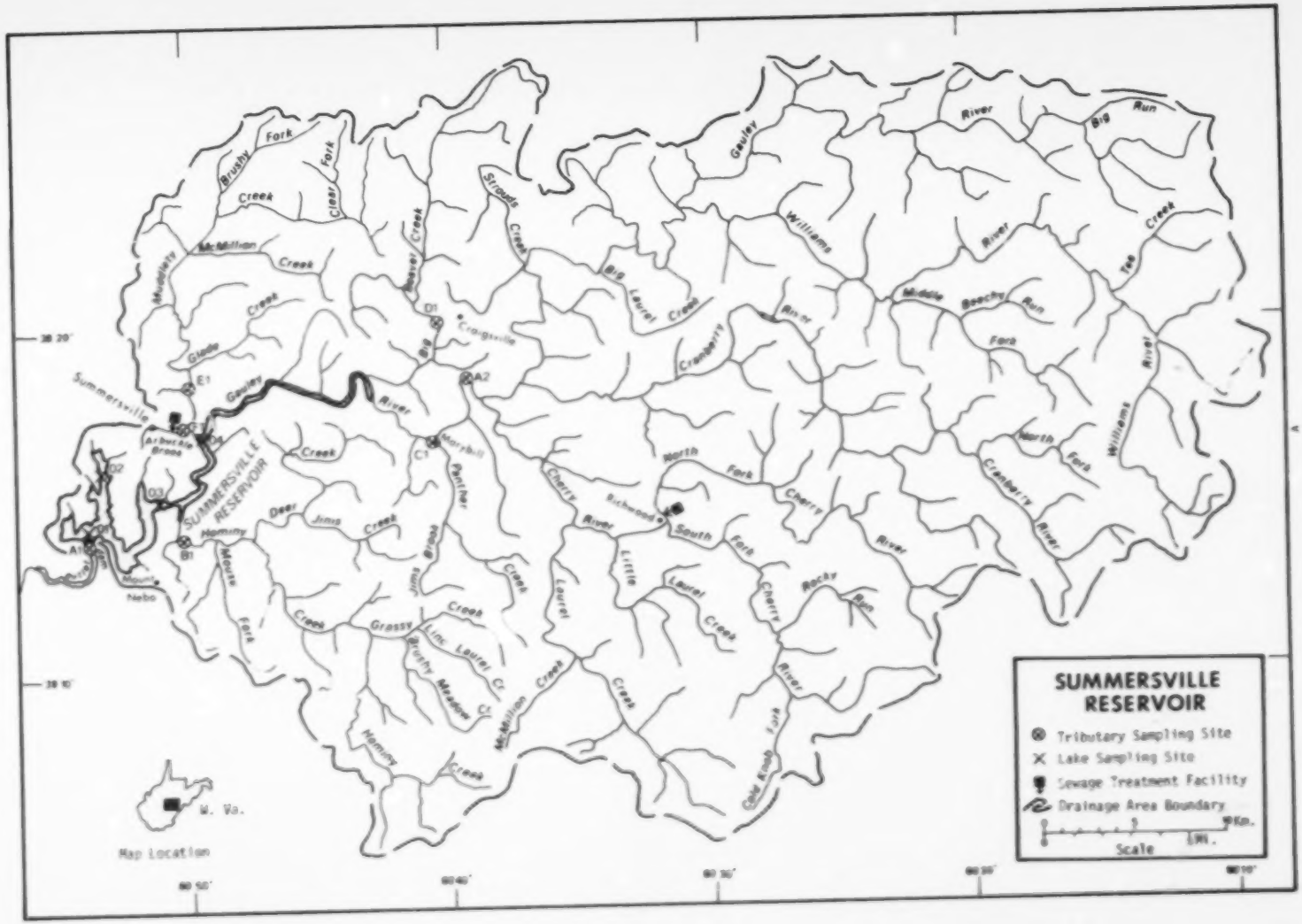
Major General Jack W. Blair, the Adjutant General of West Virginia, and Project Officer Major Manuel G. Goble, who directed the volunteer efforts of the West Virginia National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF WEST VIRGINIA

LAKE NAME	COUNTY
Bluestone	Mercer, Monroe, Summers, WV; Giles, VA
Lynn	Monongalia
Summersville	Nicholas
Tygart	Barbour, Taylor


SUMMERSVILLE RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Km.
Mi.
Scale
W. Va.
Map Location
Summersville
Craigsville
Richwood
Nebo
Arbuckle Branch
Brushy Fork
Clear Fork
Creek
McMillion Creek
Muddlety
Glade
Gauley River
Big Beaver Creek
Straight Creek
Big Laurel Creek
Cranberry River
Williams River
Middle Fork
Beachy Run
Big Run
Tea Creek
North Fork
Cherry River
South Fork
Little Laurel Creek
Laurel Creek
Rocky Run
Panther Creek
Deer Creek
Jims Creek
Meadow Fork
Grassy Creek
Big Limestone Creek
Laurel Creek
Brushy Meadow Creek
Hominy Creek
Cold Knob Fork
A1
A2
B1
C1
D1
D2
D3
D4
E1

SUMMERSVILLE RESERVOIR

STORET NO. 5403

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Summersville Reservoir is mesotrophic. It ranked third when the four West Virginia lakes sampled in 1973 were compared using a combination of six parameters*. Two of the lakes had less median total phosphorus, median dissolved phosphorus, median inorganic nitrogen, and mean chlorophyll a, but none of the other lakes had greater mean Secchi disc transparency. Depression of dissolved oxygen with depth occurred at sampling station 1 in September and at station 4 in July.

B. Rate-Limiting Nutrient:

The algal assay results indicate Summersville Reservoir was phosphorus limited at the time the sample was collected (04/03/73). The reservoir data indicate phosphorus limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution of point sources amounted to 14.3% of the total reaching the reservoir during the sampling year. The wastewater treatment plants at Richwood and Summersville were the only known point sources and contributed 4.1% and 10.2% of the load, respectively.

* See Appendix A.

The present phosphorus loading of 2.82 $g/m^2/yr$ is about 1.3 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 12). While even complete removal of phosphorus at the two point sources would still leave a eutrophic loading (2.41 $g/m^2/yr$), the reservoir is phosphorus limited, and all phosphorus inputs should be reduced to the greatest practicable degree to prolong the existing water quality.

2. Non-point sources--Of the gaged tributaries, Gauley River contributed 51.7% of the total phosphorus load; Hominy Creek, 11.1%; Muddlety Creek, 9.2%; Big Beaver Creek, 6.7%; Panther Creek, 1.2%; and Arbuckle Brook was estimated to have contributed 0.3%. The ungaged drainage area was estimated to have contributed 4.9% of the total phosphorus load reaching the reservoir during the sampling year.

The phosphorus export rates of the Summersville Reservoir tributaries ranged from 8 to 20 $kg/km^2/year$ (see page 11). These rates compare well with the export rates of seven unimpacted tributaries of nearby Bluestone Reservoir* (mean of 8 $kg/km^2/yr$; range of 6 to 12 $kg/km^2/yr$).

* Working Paper No. 467.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 11.02 kilometers^2.
2. Mean depth: 21.0 meters.
3. Maximum depth: 82.3 meters.
4. Volume: 231.420 x 10^6 m^3.
5. Mean hydraulic retention time: 50 days (based on outlet flow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Gauley River	1,367.5	34.4
Hominy Creek	269.4	6.4
Panther Creek	43.8	1.2
Big Beaver Creek	102.6	2.8
Muddlety Creek	173.8	4.6
Arbuckle Brook	7.1	0.2
Minor tributaries & immediate drainage -	107.2	3.5
Total	2,071.4	53.1

2. Outlet -

Gauley River	2,082.4**	53.5

C. Precipitation***:

1. Year of sampling: 132.8 centimeters.
2. Mean annual: 103.7 centimeters.

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† Table of metric equivalents--Appendix B.
†† Robinson, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Summersville Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from four stations on the reservoir and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the April visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 68.6 meters at station 1, 16.8 meters at station 2, 36.6 meters at station 3, and 18.3 meters at station 4.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR SUMMERSVILLE RESERVOIR
STORET CODE 5403

PARAMETER	1ST SAMPLING (4/ 3/73) 4 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/18/73) 4 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/28/73) 4 SITES RANGE	MEAN	MEDIAN
TEMP (C)	6.0 - 12.0	9.5	9.3	9.0 - 27.8	20.8	21.1	9.8 - 25.0	22.1	23.6
DISS OXY (MG/L)	10.2 - 11.5	10.9	11.0	4.1 - 8.6	7.3	7.5	0.4 - 8.4	5.7	6.0
CNDCTVY (MCROMO)	50. - 50.	50.	50.	25. - 90.	50.	50.	36. - 88.	68.	69.
PH (STAND UNITS)	7.1 - 7.2	7.2	7.2	6.0 - 7.7	6.6	6.4	5.8 - 7.2	6.4	6.4
TOT ALK (MG/L)	10. - 10.	10.	10.	10. - 14.	10.	10.	10. - 15.	11.	11.
TOT P (MG/L)	0.009 - 0.027	0.014	0.014	0.007 - 0.021	0.010	0.009	0.008 - 0.025	0.012	0.011
ORTHO P (MG/L)	0.002 - 0.006	0.003	0.002	0.004 - 0.009	0.007	0.007	0.005 - 0.016	0.007	0.007
NO2+NO3 (MG/L)	0.710 - 0.830	0.782	0.790	0.410 - 0.820	0.593	0.590	0.280 - 0.820	0.431	0.380
AMMONIA (MG/L)	0.030 - 0.090	0.046	0.040	0.040 - 0.100	0.069	0.070	0.040 - 0.190	0.059	0.050
KJEL N (MG/L)	0.200 - 0.300	0.210	0.200	0.200 - 0.600	0.295	0.200	0.200 - 0.800	0.336	0.300
INORG N (MG/L)	0.760 - 0.880	0.828	0.840	0.450 - 0.880	0.662	0.660	0.370 - 0.870	0.490	0.430
TOTAL N (MG/L)	0.910 - 1.100	0.991	0.990	0.610 - 1.220	0.889	0.880	0.480 - 1.250	0.767	0.760
CHLRPYL A (UG/L)	0.3 - 0.7	0.5	0.4	4.9 - 19.4	13.4	14.7	2.5 - 7.2	4.8	4.8
SECCHI (METERS)	0.5 - 1.0	0.6	0.5	4.6 - 6.4	5.5	5.5	2.8 - 4.9	3.6	3.3

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/03/73	1. Navicula sp.	60
	2. Tetraedron sp.	20
	3. Flagellates	20
	Total	100
07/18/73	1. Flagellates	317
	2. Melosira sp.	284
	3. Synedra sp.	67
	4. Cyclotella sp.	50
	5. Sphaerocystis sp.	17
	Total	735
09/28/73	1. Centric diatoms	579
	2. Dinobryon sp.	482
	3. Cyclotella sp.	241
	4. Melosira sp.	205
	5. Flagellates	133
	Other genera	73
	Total	1,713

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
04/03/73	01	0.7
	02	0.3
	03	0.5
	04	0.4
07/18/73	01	17.3
	02	12.1
	03	19.4
	04	4.9
09/28/73	01	5.6
	02	7.2
	03	2.5
	04	4.0

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.719	0.1
0.050 P	0.055	0.719	11.2
0.050 P + 1.0 N	0.055	1.719	13.6
1.0 N	0.005	1.719	0.1

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Summersville Reservoir was low at the time the sample was collected (04/03/73). There was a significant increase in yield when only orthophosphorus was added, but the yield was not changed when nitrogen alone was added. Based on these results, phosphorus limitation is indicated.

The reservoir data also indicate phosphorus limitation; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 42/1 or greater at all sampling stations and times, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the West Virginia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of February and March when two samples were collected. Sampling was begun in July, 1973, and was completed in June, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the West Virginia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

Except for Arbuckle Brook, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Arbuckle Brook was sampled from the north bank a short distance downstream from the Summersville wastewater treatment plant outfall (also on the north bank), and the high nutrient levels in the samples (see Appendix E) are believed to be due to inadequate mixing of the plant effluent with the stream water at the sampling point. Therefore, the non-point nutrient loads in this stream were estimated.

The nutrient loads of Arbuckle Brook and the unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations B-1, C-1,

* See Working Paper No. 175.

D-1, and E-1 and multiplying the means by the Arbuckle Brook and ZZ areas in km^2.

The operators of the Richwood and Summersville wastewater treatment plants provided monthly effluent samples; however, corresponding flow data were not provided by the Summersville operator. Consequently, the nutrient loads from this plant were estimated at 1.134 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m^3/capita/day.

A. Waste Sources:

1. Known municipal -

Name	Pop Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Richwood*	4,000	act. sludge	1,519.5	Cherry River
Summersville*	2,800	Imhoff	1,059.8	Arbuckle Brook

2. Known industrial - None

* Marlow, 1973; Hypes, 1973.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Gauley River	16,025	51.7
Hominy Creek	3,435	11.1
Panther Creek	370	1.2
Big Beaver Creek	2,070	6.7
Muddlety Creek	2,860	9.2
Arbuckle Brook	100	0.3
b. Minor tributaries & immediate drainage (non-point load) -	1,530	4.9
c. Known municipal STP's -		
Richwood	1,265	4.1
Summersville	3,175	10.2
d. Septic tanks - unknown	-	-
e. Known industrial - none	-	-
f. Direct precipitation* -	195	0.6
Total	31,025	100.0

2. Outputs -

Lake outlet - Gauley River 27,975

3. Net annual P accumulation - 3,050 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Gauley River	868,995	62.3
Hominy Creek	183,865	13.2
Panther Creek	62,435	4.5
Big Beaver Creek	66,240	4.8
Muddlety Creek	92,205	6.6
Arbuckle Brook	5,830	0.4
b. Minor tributaries & immediate drainage (non-point load) -	88,010	6.3
c. Known municipal STP's -		
Richwood	4,885	0.4
Summersville	9,525	0.7
d. Septic tanks - unknown	-	-
e. Known industrial - none	-	-
f. Direct precipitation* -	11,900	0.8
Total	1,393,890	100.0

2. Outputs -

Lake outlet - Gauley River	1,414,220

3. Net annual N loss - 20,330 kg.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Gauley River	12	635
Hominy Creek	13	682
Panther Creek	8	1,425
Big Beaver Creek	20	646
Muddlety Creek	16	531

* See Working Paper No. 175.

E. Yearly Loadings:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	2.82	0.28	126.5	loss*

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Summersville Reservoir:	
"Dangerous" (eutrophic loading)	2.20
"Permissible" (oligotrophic loading)	1.10

* There was an apparent loss of nitrogen during the sampling year. This may have resulted from nitrogen fixation in the reservoir, solubilization of previously sedimented nitrogen, unknown and unsampled point sources discharging directly to the reservoir, or underestimation of the minor tributary and immediate drainage load. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's National Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	5404	TYGART RESERVOIR	450
2	5402	LAKE LYNN RESERVOIR	350
3	5403	SUMMERSVILLE RESERVOIR	299
4	5401	BLUESTONE RESERVOIR	100

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
5401	BLUESTONE RESERVOIR	0.074	1.080	473.700	14.900	11.800	0.018
5402	LAKE LYNN RESERVOIR	0.006	0.490	403.222	4.733	14.800	0.003
5403	SUMMERSVILLE RESERVOIR	0.011	0.660	363.618	6.242	14.600	0.006
5404	TYGART RESERVOIR	0.006	0.430	378.667	1.178	14.700	0.005

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
5401	BLUESTONE RESERVOIR	0 (0)	0 (0)	0 (0)	0 (0)	100 (3)	0 (0)	100
5402	LAKE LYNN RESERVOIR	83 (2)	67 (2)	33 (1)	67 (2)	0 (0)	100 (3)	350
5403	SUMMERSVILLE RESERVOIR	33 (1)	33 (1)	100 (3)	33 (1)	67 (2)	33 (1)	299
5404	TYGART RESERVOIR	83 (2)	100 (3)	67 (2)	100 (3)	33 (1)	67 (2)	450

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR WEST VIRGINA 3/25/75

LAKE CODE 5403 SUMMERSVILLE RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 2082.4

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5403A1	2082.4	79.29	76.46	93.45	70.79	56.63	31.15	31.15	28.32	28.32	31.15	48.14	67.96	53.48
5403A2	1367.5	50.12	51.82	66.83	50.40	38.23	27.33	25.82	19.77	9.88	14.84	24.58	33.98	34.39
5403B1	269.4	10.48	11.61	15.01	10.76	7.36	3.68	3.11	2.55	1.42	2.27	4.25	5.10	6.44
5403C1	43.8	1.84	1.84	2.41	1.84	1.27	0.71	0.71	0.57	0.28	0.57	0.85	1.27	1.18
5403D1	102.6	4.25	4.53	5.66	4.25	2.83	1.70	1.56	1.42	0.71	1.27	2.12	3.11	2.78
5403E1	173.8	7.08	7.36	9.34	7.08	4.81	2.69	2.69	2.41	1.13	2.12	3.68	5.10	4.61
5403F1	7.1	0.28	0.28	0.42	0.28	0.20	0.11	0.11	0.08	0.06	0.08	0.14	0.17	0.19
5403ZZ	119.1	4.81	4.25	4.81	3.96	3.40	1.98	2.27	2.27	2.55	3.40	4.25	4.53	3.54

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 2082.4
SUM OF SUB-DRAINAGE AREAS = 2083.3

TOTAL FLOW IN = 638.96
TOTAL FLOW OUT = 642.79

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5403A1	7	73	18.07	28	3.48				
	8	73	17.95	27	10.11				
	9	73	28.40	23	49.27				
	10	73	53.49	18	48.70				
	11	73	147.81	16	122.33				
	12	73	106.58	16	97.41				
	1	74	167.24	13	4.93				
	2	74	63.91	3	69.09	17	79.29		
	3	74	110.78	3	93.16	17	111.00		
	4	74	4.11	21	4.33				
	5	74	62.44	13	194.54				
	6	74	112.50	10	28.88				
5403A2	7	73	10.68	28	8.89				
	8	73	11.98	27	10.99				
	9	73	7.36	23	5.35				
	10	73	28.63	18	9.37				
	11	73	68.05	16	74.47				
	12	73	88.49	16	43.32				
	1	74	100.30	13	131.11				
	2	74	40.01	3	36.25	17	44.17		
	3	74	77.42	3	69.94	17	74.76		
	4	74	50.57	21	19.11				
	5	74	44.83	13	139.89				
	6	74	74.70	10	20.39				

TRIBUTARY FLOW INFORMATION FOR WEST VIRGINA 3/25/75

LAKE CODE 5403 SUMMERSVILLE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5403B1	7	73	3.37	28	2.27				
	8	73	2.35	27	2.29				
	9	73	0.51	23	0.40				
	10	73	1.64	18	0.40				
	11	73	10.51	16	5.27				
	12	73	13.85	16	9.51				
	1	74	17.27	13	33.41				
	2	74	5.80	3	6.37	17	6.65		
	3	74	11.33	3	4.81				
	4	74	7.65	20	2.80				
	5	74	6.37	13	23.22				
	6	74	6.68	10	2.52				
5403C1	7	73	0.26	28	0.25				
	8	73	0.31	27	0.27				
	9	73	0.24	23	0.14				
	10	73	0.99	18	0.28				
	11	73	1.98	16	2.78				
	12	73	2.75	16	1.08				
	1	74	3.11	13	4.02				
	2	74	1.30	3	1.08	17	1.39		
	3	74	2.38	3	2.55	17	2.21		
	4	74	1.56	21	0.48				
	5	74	1.42	13	3.96				
	6	74	2.61	10	0.74				
5403D1	7	73	0.62	28	0.59				
	8	73	0.74	27	0.62				
	9	73	0.57	23	0.34				
	10	73	2.27	18	0.65				
	11	73	4.76	16	6.46				
	12	73	6.40	16	2.55				
	1	74	7.22	13	9.34				
	2	74	3.03	3	2.55	17	3.26		
	3	74	5.55	3	5.95	17	5.10		
	4	74	3.60	21	1.13				
	5	74	3.31	13	9.26				
	6	74	6.09	10	1.70				
5403E1	7	73	1.05	28	0.99				
	8	73	1.25	27	1.08				
	9	73	0.96	23	0.57				
	10	73	3.96	18	1.08				
	11	73	7.93	16	11.04				
	12	73	10.76	16	4.25				
	1	74	12.18	13	15.86				
	2	74	5.10	3	4.25	17	5.52		
	3	74	9.40	3	10.19	17	87.78		
	4	74	6.09	21	1.90				
	5	74	5.61	13	15.69				
	6	74	10.31	10	2.92				

TRIBUTARY FLOW INFORMATION FOR WEST VIRGINA 3/25/75

LAKE CODE 5403 SUMMERSVILLE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5403F1	7	73	0.04	28	0.04				
	8	73	0.05	27	0.05				
	9	73	0.04	23	0.02				
	10	73	0.16	18	0.05				
	11	73	0.31	16	0.45				
	12	73	0.45	16	0.18				
	1	74	0.51	13	0.65				
	2	74	0.21	3	0.18	17	0.23		
	3	74	0.40	3	0.42	17	0.37		
	4	74	0.25	21	0.08				
	5	74	0.23	13	0.65				
	6	74	0.42	10	0.12				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/03/25

540301
38 13 03.0 080 53 31.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES 2111202
3 0180 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO		00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/03	10 00	0000	10.1				50K	7.20	10K	0.050	0.200K	0.830	0.003
	10 00	0006	10.1	10.7			50K	7.20	10K	0.040	0.200K	0.810	0.003
	10 00	0015	10.0	10.8			50K	7.20	10K	0.040	0.200K	0.780	0.002
	10 00	0050	9.2	11.1			50K	7.20	10K	0.040	0.200K	0.760	0.002
	10 00	0075	8.5	10.7			50K	7.20	10K	0.040	0.200K	0.750	0.002
	10 00	0100	7.4	11.4			50K	7.20	10K	0.050	0.200K	0.730	0.003
	10 00	0135	6.3	11.5			50K	7.20	10K	0.060	0.200K	0.740	0.002
	10 00	0175	6.0	11.1			50K	7.10	10K	0.050	0.200K	0.710	0.002
73/07/18	14 25	0000	27.4	8.1		204	58	7.10	10K	0.060	0.400	0.530	0.009
	14 25	0005	27.2				55						
	14 25	0020	26.2	8.6			66	6.90	10K	0.050	0.300	0.520	0.007
	14 25	0025	24.5				60						
	14 25	0030	23.0				58						
	14 25	0035	22.2				56						
	14 25	0040	21.4	6.6			50	6.30	10	0.060	0.200	0.590	0.008
	14 25	0060	18.6				40						
	14 25	0080	16.9	8.0			35	6.30	10K	0.080	0.500	0.680	0.007
	14 25	0100	16.0				32						
	14 25	0120	15.6	7.8			32	6.30	10K	0.070	0.300	0.700	0.006
	14 25	0140	15.4				30						
	14 25	0150	15.3				27						
	14 25	0160	15.2				26						
	14 25	0170	15.1	7.5			26	6.10	10K	0.080	0.300	0.710	0.007
	14 25	0180	15.0				27						
	14 25	0190	14.7				27						
	14 25	0200	13.6				33						
	14 25	0210	11.8				30						
	14 25	0215	10.7				28						
	14 25	0220	9.8				26						
	14 25	0225	9.0	5.5			25	6.00	10K	0.060	0.400	0.820	0.007
73/09/28	14 55	0000	25.0			140	72	6.70	12	0.060	0.600	0.390	0.008
	14 55	0005	24.0	8.0			70	7.20	12	0.050	0.500	0.380	0.012
	14 55	0025	23.7	6.8			69	6.20	12	0.050	0.400	0.390	0.008
	14 55	0050	23.5	6.0			69	6.20	11	0.060	0.400	0.400	0.007
	14 55	0075	22.7	2.6			65	5.80	11	0.040	0.400	0.560	0.007
	14 55	0100	22.0	4.0			59	5.80	11	0.040	0.400	0.590	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540301
38 13 03.0 080 53 31.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES
3

2111202
0180 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/09/28	14 55	0125	21.5	3.6		57	5.90	11	0.050	0.300	0.600	0.005
	14 55	0150	20.9	4.2		57	6.10	10	0.060	0.500	0.570	0.005
	14 55	0175	18.3	0.4		48	6.00	14	0.190	0.800	0.450	0.005
	14 55	0185	12.0	4.5		40	5.80	10K	0.040	0.300	0.760	0.006
	14 55	0200	9.8	3.2		36	6.00	10	0.050	0.200	0.820	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540301
38 13 03.0 080 53 31.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES 2111202
3 0180 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/03	10 00	0000	0.014	0.7
	10 00	0006	0.009	
	10 00	0015	0.011	
	10 00	0050	0.013	
	10 00	0075	0.011	
	10 00	0100	0.011	
	10 00	0135	0.010	
	10 00	0175	0.014	
73/07/18	14 25	0000	0.009	17.3
	14 25	0020	0.009	
	14 25	0040	0.010	
	14 25	0080	0.011	
	14 25	0120	0.008	
	14 25	0170	0.010	
	14 25	0225	0.012	
73/09/28	14 55	0000	0.011	5.6
	14 55	0005	0.015	
	14 55	0025	0.010	
	14 55	0050	0.009	
	14 55	0075	0.009	
	14 55	0100	0.008	
	14 55	0125	0.008	
	14 55	0150	0.009	
	14 55	0175	0.015	
	14 55	0185	0.010	
	14 55	0200	0.010	

STORET RETRIEVAL DATE 75/03/25

540302
38 15 41.0 080 53 03.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES
3

2111202
0021 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/03	10	30 0000	11.8		18	50K	7.20	10K	0.040	0.200K	0.780	0.002
	10	30 0004	11.8	10.4		50K	7.10	10K	0.050	0.200	0.790	0.002
	10	30 0015	10.0	10.8		50K	7.10	10K	0.040	0.200K	0.760	0.002
73/07/18	15	50 0000	27.4	8.3	252	55	7.20	10	0.060	0.600	0.510	0.009
	15	50 0010	27.0			54						
	15	50 0015	26.9			56						
	15	50 0018	26.7	8.4		55	7.00	11	0.060	0.500	0.500	0.006
	15	50 0020	26.4			55						
	15	50 0025	25.0			62						
	15	50 0030	23.2			56						
	15	50 0040	21.1	8.6		45	6.40	11	0.080	0.500	0.600	0.006
	15	50 0045	20.6			46						
	15	50 0050	19.9			45						
	15	50 0055	19.2	6.9		44	6.20	10K	0.090	0.200K	0.610	0.006
73/09/28	15	25 0000	24.7		112	65	7.00	10	0.040	0.600	0.350	0.008
	15	25 0005	24.0	8.4		67	6.60	10K	0.040	0.400	0.340	0.007
	15	25 0025	23.7	7.2		66	6.20	10K	0.050	0.400	0.360	0.006
	15	25 0035	23.6	7.6		66	6.10	10K	0.050	0.200K	0.330	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540302
38 15 41.0 080 53 03.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES 2111202
3 0021 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/03	10 30	0000	0.027	0.3
	10 30	0004	0.015	
	10 30	0015	0.015	
73/07/18	15 50	0000	0.010	12.1
	15 50	0018	0.007	
	15 50	0040	0.007	
	15 50	0055	0.008	
73/09/28	15 25	0000	0.012	7.2
	15 25	0005	0.012	
	15 25	0025	0.010	
	15 25	0035	0.010	

STORET RETRIEVAL DATE 75/03/25

540303
38 14 24.0 080 50 57.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES
3

2111202
0084 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/03	11 00	0000	12.0		18	50K	7.10	10K	0.050	0.200K	0.800	0.003
	11 00	0004	12.0	10.2		50K	7.10	10K	0.040	0.300	0.800	0.006
	11 00	0015	11.3	10.3		50K	7.10	10K	0.050	0.200	0.810	0.004
	11 00	0035	10.4	11.1		50K	7.10	10K	0.040	0.200K	0.800	0.003
	11 00	0055	8.4	11.0		50K	7.10	10K	0.040	0.200K	0.780	0.002
	11 00	0080	7.5	10.6		50K	7.10	10K	0.090	0.300	0.760	0.002
73/07/18	16 30	0000	27.8		228	67	7.20	10K	0.100	0.200K	0.530	0.005
	16 30	0010	27.1			63						
	16 30	0015	27.0			65						
	16 30	0020	26.1	7.2		90	6.90	14	0.080	0.200K	0.450	0.008
	16 30	0025	24.7			84						
	16 30	0030	23.7			89						
	16 30	0040	21.7	6.9		63	6.60	11	0.070	0.200K	0.590	0.008
	16 30	0050	19.8			45						
	16 30	0060	18.7			48						
	16 30	0070	17.6	7.4		46	6.40	10K	0.080	0.200	0.680	0.007
	16 30	0080	16.9			39						
	16 30	0090	16.3			37						
	16 30	0100	15.7	8.0		36	6.30	10K	0.050	0.200K	0.690	0.007
	16 30	0120	15.5	6.3		38	6.20	10K	0.080	0.200K	0.690	0.006
73/09/28	16 05	0000	24.3		192	73	6.50	12	0.050	0.200K	0.380	0.006
	16 05	0005	23.9	7.0		75	6.80	12	0.040	0.200K	0.380	0.007
	16 05	0030	23.6	6.8		74	6.50	12	0.050	0.200K	0.380	0.010
	16 05	0055	23.4	5.0		87	6.40	12	0.060	0.200K	0.400	0.007
	16 05	0075	22.6	6.0		82	6.40	12	0.090	0.200K	0.340	0.006
	16 05	0100	22.0	5.8		75	6.40	11	0.100	0.200K	0.330	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540303
38 14 24.0 080 50 57.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES 2111202
3 0084 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/03	11 00	0000	0.018	0.5
	11 00	0004	0.016	
	11 00	0015	0.017	
	11 00	0035	0.014	
	11 00	0055	0.014	
	11 00	0080	0.013	
73/07/18	16 30	0000	0.008	19.4
	16 30	0020	0.009	
	16 30	0040	0.021	
	16 30	0070	0.009	
	16 30	0100	0.008	
	16 30	0120	0.009	
73/09/28	16 05	0000	0.009	2.5
	16 05	0005	0.011	
	16 05	0030	0.011	
	16 05	0055	0.010	
	16 05	0075	0.012	
	16 05	0100	0.014	

STORET RETRIEVAL DATE 75/03/25

540304
38 16 00.0 080 49 00.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES 2111202
3 0031 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/03	11 45	0000	9.2		38	50K	7.20	10K	0.040	0.200K	0.820	0.003
	11 45	0006	9.3	11.1		50K	7.20	10K	0.040	0.200K	0.790	0.002
	11 45	0015	9.1	11.0		50K	7.20	10K	0.030	0.200K	0.810	0.003
	11 45	0026	9.1	11.0		50K	7.20	10K	0.040	0.200K	0.810	0.002
73/07/18	18 40	0000	27.8	8.5	180	72	7.70	11	0.040	0.200	0.410	0.005
	18 40	0005	27.2			72						
	18 40	0010	27.0			72						
	18 40	0015	26.7			88						
	18 40	0020	25.6	7.5		75	6.90	12	0.060	0.200K	0.430	0.005
	18 40	0025	24.5			63						
	18 40	0030	23.3			59						
	18 40	0040	21.5	6.0		58	6.40	10K	0.080	0.200K	0.550	0.005
	18 40	0045	20.8			51						
	18 40	0050	19.9			47						
	18 40	0055	19.3			46						
	18 40	0060	18.5	4.1		45	6.10	10K	0.050	0.200K	0.670	0.004
73/09/28	15 45	0000	24.4		116	79	6.80	10	0.040	0.200	0.330	0.006
	15 45	0005	23.7	7.6		79	7.10	12	0.050	0.200K	0.330	0.007
	15 45	0025	23.6	7.8		79	6.60	12	0.040	0.200K	0.330	0.006
	15 45	0045	22.7	6.8		88	6.30	15	0.090	0.200	0.280	0.016

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540304
38 16 00.0 080 49 00.0
SUMMERSVILLE RESERVOIR
54067 WEST VIRGINIA

11EPALES 2111202
3 0031 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/03	11 45	0000	0.015	0.4
	11 45	0006	0.016	
	11 45	0015	0.015	
	11 45	0026	0.014	
73/07/18	18 40	0000	0.011	4.9
	18 40	0020	0.012	
	18 40	0040	0.012	
	18 40	0060	0.011	
73/09/28	15 45	0000	0.018	4.0
	15 45	0005	0.018	
	15 45	0025	0.016	
	15 45	0045	0.025	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/03/25

5403A1
38 13 20.0 080 53 30.0
GAULEY RIVER
54061 15 WINONA
O/SUMMERSVILLE RES
BELO DAM 3 MI ESE OF KESSLERS CROSS LANE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/28	13 10		0.680	0.100K	0.018	0.007	0.010
73/08/27	14 35		0.605	0.100K	0.043	0.005K	0.010
73/09/23	16 50		0.510	0.180	0.046	0.005K	0.005K
73/10/18	10 45		0.390	0.200	0.031	0.021	
73/11/16	12 15		0.530	0.150	0.040	0.005K	0.005K
73/12/16	09 45		0.650	0.200	0.048	0.008	0.020
74/01/13	13 25		0.740	0.100	0.040	0.008	0.040
74/02/03	15 40		0.720	0.100K	0.030	0.005K	0.010
74/02/17	10 05		0.672	0.200	0.040	0.010	0.010
74/03/03	13 50		0.780	0.300	0.055	0.005	0.035
74/03/17	10 00		0.770	0.200	0.030	0.005K	0.015
74/04/21	14 20		0.600	0.400	0.060	0.005K	0.015
74/05/13	19 00		0.720	0.200	0.050	0.005K	0.015
74/06/10	10 00		0.570	0.300	0.060	0.010	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5403A2
38 15 05.0 080 39 00.0
GAULEY RIVER
54 NICHOLAS CO HWY
I/SUMMERSVILLE RES
BANK 25 MI BELO RT 20 BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/26	10	20	0.450	0.100K	0.010	0.005K	0.010
73/08/27	19	15	0.340	0.100K	0.021	0.010	0.015
73/09/23	15	20	0.270	0.100K	0.025	0.006	0.015
73/10/18	11	20	0.450	0.525	0.280	0.011	0.022
73/11/16	10	30	0.600	0.150	0.021	0.005K	0.025
73/12/16	10	00	0.650	0.100K	0.020	0.005K	0.005
74/01/13	11	20	0.870	0.200	0.024	0.005K	0.010
74/02/03	17	00	0.750	0.100K	0.015		0.005
74/02/17	09	00	0.730	0.100K	0.010	0.005	0.005K
74/03/03	12	25	0.790	0.200	0.005	0.005K	0.030
74/03/17	10	00	0.820	0.200	0.025	0.005K	0.020
74/04/21	11	10	0.600	0.200	0.040	0.005K	0.020
74/05/13	17	55	0.680	0.400	0.025	0.005K	0.030
74/06/10	14	30	0.570	0.200	0.035	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540381
38 13 05.0 080 50 00.0
HOMINY CREEK
54 15 WINONA
T/SUMMERSVILLE RES
BANK AT END OF RD 2 MI NNE OF MT NEBO
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/28	15 00		0.750	0.140	0.006	0.005K	0.010
73/08/27	14 30		0.720	0.100K	0.008	0.005K	0.015
73/09/23	16 25		0.570	0.100K	0.020	0.005K	0.010
73/10/18	11 03		0.430	0.250	0.050	0.007	0.040
73/11/16	11 45		0.630	0.250	0.012	0.005K	0.010
73/12/16	10 00		0.336	0.100	0.020	0.005K	0.005
74/01/13	14 10		0.960	0.100	0.016	0.005K	0.020
74/02/03	15 05		0.730	0.100K	0.005K	0.015	0.015
74/02/17	10 25		0.720	0.100K	0.010	0.005K	0.005K
74/03/03	13 25		0.570	0.700	0.010	0.015	0.030
74/04/20	12 10		0.540	0.700	0.210	0.005K	0.005K
74/05/13	18 30		0.480	0.600	0.020	0.005K	0.035
74/06/10	12 30		0.570	0.100	0.035	0.005K	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5403C1
38 16 15.0 080 40 14.0
PANTHER CREEK
54 NICHOLAS CO HWY
T/SUMMERSVILLE RES
BANK ALONG RT 39/15 TO SEWELL COAL MINES
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/28	16 20		1.920	0.580	0.400	0.005K	0.005K
73/08/27	19 00		1.640	0.390	0.310	0.005K	0.015
73/09/23	18 19		1.960	0.500	0.378	0.005K	0.010
73/10/18	17 45		1.800	0.500	0.236	0.005K	0.010
73/11/16	12 05		0.840	0.250	0.080	0.016	
73/12/16	11 35		1.000	0.200	0.068	0.005K	0.005
74/01/13	15 17		1.040	0.200	0.192	0.005K	0.010
74/02/03	10 10		1.090	0.200	0.150	0.010	0.010
74/02/17	11 10		1.090	0.300	0.145	0.005	0.005K
74/03/03	14 30		0.970	0.700	0.095	0.005K	0.025
74/03/17	10 30		0.880	0.100	0.030	0.005K	0.005K
74/04/21	11 40		1.200	0.700	0.295	0.005K	0.010
74/05/13	17 40		0.730	0.400	0.080	0.005K	0.015
74/06/10	18 15		1.600	0.500	0.430	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

3p

STORET RETRIEVAL DATE 75/03/25

5403D1
38 19 40.0 080 40 00.0
BIG BEAVER CREEK
54 NICHOLAS CO HWY
T/SUMMERSVILLE RES
RT 5 BRDG JUST W OF CRAIGSVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/28	10 55		0.570	0.480	0.340	0.005K	0.010
73/08/27	19 40		0.370	0.270	0.270	0.005K	0.015
73/09/23	16 20		0.650	0.570	0.450	0.005K	0.025
73/10/18	10 07		0.357	0.150	0.037	0.005K	0.010
73/11/16	10 55		0.380	0.600	0.082	0.005K	0.105
73/12/16	10 25		0.320	0.100	0.068	0.005K	0.010
74/01/13	11 45		0.340	0.100K	0.052	0.005K	0.020
74/02/03	16 35		0.312	0.240	0.240	0.010	0.010
74/02/17	09 10		0.330	0.300	0.105	0.005K	0.005K
74/03/03	12 35		0.312	0.500	0.115	0.005K	0.040
74/03/17	09 00		0.340	0.500	0.140	0.005K	0.015
74/04/21	11 20		0.270	0.700	0.345	0.005K	0.010
74/05/13	18 15		0.232	0.400	0.090	0.005K	0.050
74/06/10	09 40		0.352	0.400	0.350	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5403E1
38 17 50.0 080 49 30.0
MUDDLETY CREEK
54 7.5 SUMMERSVILLE
T/SUMMERSVILLE RES
BANK AT END OF RD 19/11 1.5 NE SUMMERSVI
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/28	11 50		0.490	0.180	0.029	0.006	0.015
73/08/27	20 05		0.357	0.100K	0.019	0.005K	0.020
73/09/23	15 30		0.320	0.100K	0.024	0.005K	0.015
73/10/18	16 05		0.176	0.200	0.019	0.005K	0.005K
73/11/16	16 05		0.430	0.700	0.132	0.005K	
73/12/16	09 45		0.390	0.100K	0.040	0.005K	0.005
74/01/13	12 40		0.450	0.100	0.028	0.005K	0.020
74/02/03	09 30		0.450	0.100K	0.050	0.010	0.010
74/02/17	09 25		0.400	0.100	0.035	0.005K	0.005K
74/03/03	08 43		0.336	0.300	0.020	0.005K	0.045
74/03/17	09 30		0.384	0.300	0.040	0.005K	0.035
74/04/21	13 35		0.440	0.400	0.050	0.005K	0.010
74/05/13	17 45		0.264	0.400	0.030	0.005K	0.055
74/06/10	09 54		0.510	0.300	0.080	0.005K	0.015

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/04/14

5403F1
38 16 38.0 085 49 55.0
ARBUCKLE BRANCH
54 7.5 SUMMERSVILLE
T/SUMMERSVILLE RES.
BANK BELO "FILTRATION PLANT"
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/25	15 30		0.084	13.000	7.000	6.000	13.000
73/08/27	19 45		0.280	8.600	4.600	4.000	7.100
73/09/23	17 15		0.140	13.000	9.050	4.300	8.700
73/10/18	16 25		0.105	18.000	11.800	7.700	
73/11/16	16 20		1.000	1.200	0.180	0.128	0.765
73/12/16	11 00		0.750	3.100	0.546	0.267	0.830
74/01/13	14 40		0.770	1.000	0.188	0.106	0.590
74/02/03	09 45		0.610	2.300	0.510	0.115	0.430
74/02/17	10 45		0.620	2.900	0.525	0.175	0.630
74/03/03	09 05		0.540	1.900	0.240	0.080	0.370
74/03/17	09 45		0.672	2.300	0.240	0.100	0.270
74/04/21	13 15		0.280	8.550	2.880	0.925	3.000
74/05/13	17 55		0.330	2.600	0.550	0.350	1.100
74/06/10	17 30		0.504	4.000	0.155	0.052	1.050

STORET RETRIEVAL DATE 75/03/25

5403XA AS5403XA P004000
38 13 30.0 080 32 00.0
TOWN OF RICHWOOD
54061 15 RICHWOOD
T/SUMMERSVILLE RESERVOIR
CHERRY RIVER TO SUMMERVILLE LAKE
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/01/23	10	00	0.800	10.500	1.280	0.750	2.200	0.396	0.420
74/02/19	09	00	0.960	4.500	1.760	1.040	2.000	0.392	0.400
74/03/18	09	00	1.080	2.300	1.400	0.560	1.150	0.400	0.420
74/04/23	09	30	0.640	5.000	2.400	1.100	1.950	0.401	0.405
74/05/20	09	30	0.320	6.400	3.050	1.250	2.500	0.399	0.400
74/06/20	09	15	2.700	5.300	1.700	0.660	1.850	0.391	0.400
74/07/19	10	00	0.040	9.500	0.120	1.750	3.400	0.410	0.400
74/08/19	09	30	0.040	17.000	0.100		4.300	0.399	0.400
74/09/20	10	30	0.570	12.000	6.250	1.650	3.500	0.400	0.400
74/10/21			0.560	14.000	2.800	1.300		0.400	0.372
74/11/20	09	00	0.480	5.000	2.300	0.420	1.200	0.410	0.400
74/12/19	09	00	1.200	4.700	1.500	0.560	0.770	0.385	0.400

STORET RETRIEVAL DATE 75/03/25

5403XB PR5403XB P002800
38 16 40.0 080 49 45.0
TOWN OF SUMMERSVILLE
54 7.5 SUMMERSVILLE
D/SUMMERSVILLE RESERVOIR
ARBUCKLE CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/01/03	14 00		1.080	3.600	0.220	0.690	2.500		
74/02/07	13 00		0.720	10.000	1.320	1.160	4.700		
74/03/04	15 00		0.720	8.450	1.700	2.900	9.700		
74/05/08	09 30		0.240	32.000	7.200	3.200	7.100		
74/06/06	09 00		0.470	15.000	2.700	1.330	3.200		
74/07/16	13 30		0.040	31.000	0.160	3.150	13.500		
74/08/09	14 30		0.120	20.000	4.900	5.300	16.500		
74/09/09	11 00		0.400	15.800	2.750	2.800	9.350		
74/10/16	10 00		1.600	7.700	1.100	0.700			
74/11/06	12 30		0.480	14.000	3.430	2.750	9.800		
75/01/03	14 00		1.040	13.000	3.100	1.400	3.300		